

require to form the several parts of their bodies; their bones and blood, as well as their muscles and their fat. Thus the soil imparts to the plant only what it is the special duty of the plant to impart to the animal. Hence the machinery of life—of life animal, as well as of life vegetable—must equally cease to move, if the soil be deficient in any of its necessary ingredients. How much, therefore, both of the direct or cropping, and of the indirect or manufacturing branches of rural economy, depends upon the chemistry of the soil!

But another important fact in regard to the composition of vegetables was still unexplained, and in connexion with it another beautiful process or function of animal life. Vegetable food contains a large proportion of starch or gum, while in the body of the animal these substances are wholly wanting. What becomes of the starch when eaten? Why does it exist so abundantly in plants? What purpose does it serve in the animal economy? Again, all animals breathe. They inhale atmospheric air, containing one two-thousand-five-hundredth part of carbonic acid—and they exhale an air containing from one to four or five hundredth parts of the same gas. In other words, the living animal is constantly discharging carbon into the air, in the form of carbonic acid. Whence is this carbon derived? What part of the food supplies it?

The starch and sugar of the food supply the carbon for respiration. The leaves of plants take in carbon from the air, in the form of carbonic acid, that it may be converted into the starch and other analogous compounds of which their substance consists. The digestive organs of animals undo the work of the leaves, and their lungs return the same carbon to the air, in the same gaseous form of carbonic acid. That which enters the stomach in the form of starch, escapes from the lungs in the form of carbonic acid and watery vapour. Thus, in another way, are animal and vegetable life connected, and again they play as it were into each other's hands. And it is beautiful to consider, that while the plant and the animal appear thus to be working contrary to each other, they are, in reality, producing each what is necessary to the existence of the other, and perform each its allotted part in maintaining the existing balance or stability of things. The round of animal and vegetable life may be regarded as a little episode in the history of nature. The system of the inanimate universe is complete of itself. The dead matter of the globe is comparatively little affected by the existence of life. A small portion of it is, for a time, worked up into vegetable and animal forms, and then returns again to the earth as it was. But what a beauty, though transient, does this poetry of life impart to the face of nature, clothing it with verdure, and peopling it with moving and graceful forms! What a broad field has it afforded for the exercise of the Creator's skill and bounty!

Few persons who have not closely attended to this branch of our subject, can be aware of the many refined practical questions which are both suggested and answered by this study of the composition of the different kinds of food—of the purposes served by their several constituents—and of the dependence of each in quantity upon the soil from which our crops are reaped. All the four classes of substances contained in vegetables appear equally important to the animal. With none of them can it safely dispense. The starch is necessary to supply the wants, so to speak, of the respiration—the gluten to build up the substance of the muscles—the fat to lubricate the joints, to round off the extremities of the bones, to fill up the cellular tissue, and to enable the muscles to play freely among each other—while the saline and earthy constituents of the plant yield the salts of the blood and other animal fluids, and the earthy phosphates and carbonates of the bones.

It is true that, in cases of exigency, pliant nature permits some of these substances to be converted to the natural uses of the other. The starch of the food may be partly employed in the production of animal fat, when fatty substances are present in too small quantity in the food; while from the fat, and even from the gluten of the food, may be derived the carbon of respiration, when starch, gum, or sugar are eaten less abundantly. But the economy of feeding consists in supplying the natural wants of the animal in the most natural form—imposing upon the digestive organs the least possible labour; and in adjusting, besides, the quality of the food, or the proportion of its several constituents, to the special purpose for which the animal is fed. In all these remarks, it will be understood that we refer only to the herbivorous races—those which the farmer rears as instruments or machines for the converting of roots and herbage into palatable food for man.

## NEWS.

**FAILURE OF FATHER MATHEW'S SUBSCRIPTION.**—The appeal made to the nation on behalf of the Great Apostle of Temperance, has proved a failure. The whole sum subscribed amounts to only £594 7s, out of which £216 were contributed by eight individuals. We thought the testimonial to Mr. Rowland Hill for his Post-office reform (£10,000) inadequate and niggardly, but, compared with the recompense to Father Mathew, it was splendidly generous. It is a most melancholy fact, that the true benefactors of the human race are rarely, if ever, appreciated; and it speaks little in favour of the moral civilisation of the nineteenth century, that he who sacrificed his private fortune to uphold and propagate the soundest principle of social reform, should be abandoned to beggary by the very people whose condition he sought to elevate and purify. Whatever may be the merits of Teetotalism, it is certainly not a teacher of gratitude. It is computed that the number of total abstainers in this country amount to one million. We have seen what they have contributed to the founder of their doctrines, and a slight arithmetical labour will show what might have been subscribed by donations, ranging from 1d to 1s. When the appeal was first made, the more sanguine spoke confidently of £30,000! We have seen the fulfilment of the prophecy, and it ought to cover the whole body with shame and humiliation.—There is not a Temperance Hall or a Rechabite Tent in the kingdom, whose honour is not engaged to wipe away this foul reproach. It is not too late to repent of past apathy, and give practical proof that the repentance is sincere. Committees may yet be organised in every district, and a fresh canvass be instituted. It is a dark stain on humanity and on our nation, this shameful abandonment of our disinterested benefactor. Not only is Father Mathew entitled to his reward for past losses and exertions, but the future progress of the cause is placed in jeopardy by this desertion of his professed followers. Will the drunkards believe that the temperate are sincere, when they allow their leader, guide, and teacher to feel the sharp stings of poverty, after all the sacrifices he has made? What opinion will the lovers of strong drinks form of the moral effects of Total Abstinence, when they hear that its Apostle might have rotted in a gaol for want of the rescuing hand of his disciples? We will not yet believe, even with the evidence of the wretched subscription before our eyes, that the Tee-totalers can be guilty of such deliberate and callous ingratitude as that evidence establishes; we must conclude that the appeal has not been properly made, and, hoping that it may yet be made with judgment, we look forward to an early opportunity of announcing that the response to it has been worthy of the cause.—*Sentinel*.

**PROTESTANTISM IN FRANCE.**—The following statistical amount of Protestantism in France has just been published:—In 1815 there was 464 Protestant pastors; in 1830, 527; in 1843, 677; and now there are more than 700. Under the empire, the budget of the Protestant church was 306,000*l.*; under the Restoration, 476,000*l.*; and in 1843, 1,219,000*l.* The number of Protestant churches has increased in proportion, but there are still 111 localities without them. The number of Protestants in France is given at four millions.

**DR. CUNNINGHAM ON AMERICAN SLAVERY.**—Our readers are aware that several of the Presbyteries of the Free Scotch church have now before them the question of whether they shall continue fellowship with American churches, while they continue to tolerate slavery, and also whether the money received from the churches in slaveholding regions by the deputation in their visit to this country last year, shall be returned or retained. Dr. Cunningham, one of the deputation, has lately published a letter on the subject, in which he embodies his views, which those who know the man, as well as those interested in the general question, will be glad to see whether they approve of them or not:

1. The question of retaining and applying the money from the United States, depends wholly upon the question, whether it was right to recognize the evangelical churches of America as churches of Christ, and to hold intercourse with them as such.
2. There is nothing in the actual relation held by the evangelical churches of America to the slavery existing and established there, or in the conduct adopted by them regarding it, (a subject this, by the way, on which much misapprehension prevails in this country, in consequence of the implicit credence